WORKING IT OUT: EXAMINING THE PSYCHOLOGICAL EFFECTS OF MUSIC AND EXERCISE AND EXPLORING THE THEORETICAL BACKGROUND OF HEALTH BEHAVIORS

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Working It Out: Examining the Psychological Effects of Music and Exercise and Exploring the Theoretical Background of Health Behaviors

by

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Author Note

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Abstract

Exercise has been linked to mood benefits, and music may increase these effects. The purpose of the present study was to investigate the psychological effects of music and exercise. Exercise was hypothesized to increase mood more significantly in those who listened to music. Listening to music while exercising was also hypothesized to lead to lower perceived exertion and higher exercise enjoyment. Participants (N = 148) completed 20 minutes of moderately-paced walking, either with or without a personal music player. Exercise significantly increased mood in all measured dimensions. Exercise enjoyment was significantly higher among participants who exercised with music and music moderated the effect of exercise on post-exercise pleasantness. The psychological effects of music while exercising are discussed with possible applications to maintaining exercise adherence.

Working It Out: Examining the Psychological Effects of Music and Exercise

Exercise is an essential contributor to both mental and physical health. The Centers for Disease Control and Prevention listed that regular exercise lowers the risk for cardiovascular disease, type 2 diabetes, and certain cancers (CDC, 2011). Furthermore, research indicates that regular exercise is linked to immediate mood benefit and reduced the risk of developing depression over time (Hansen, Stevens, & Coast, 2001; van Gool et al., 2007). For individuals with clinically diagnosed depression, exercise therapy can be as beneficial as treatment with an antidepressant medication (Blumenthal et al., 2007), to the extent that a meta-analysis of exercise-mood research recommended that psychiatrists prescribe an exercise intervention to depressed patients (Craft & Perna, 2004). Despite these findings, approximately 49% of adult Americans do not achieve minimum exercise recommendations (HHS, CDC, & NCHS, 2011). For this reason, research on the moderators of the psychological effects of exercise is needed in order to effectively encourage individuals to begin and/or maintain the most productive and beneficial exercise routine. Music has been suggested to influence the psychological and psychophysical effects of exercise, and it may provide a valuable addition to an exercise routine.

Exercise, Music, and Mood

Research has consistently demonstrated that exercise can boost various dimensions of mood (Rocheleau, Webster, Bryan, & Frazier, 2004), and it is also understood that the mood benefit of exercise is a major predictor of exercise adherence (Papandonatos et al., 2007). Amplifying the mood benefit of exercise therefore has the potential to increase exercise adherence, and exercising with music may successfully serve this purpose. Exercising with music has been indicated to more significantly benefit mood when compared to exercising without music (Kareoghis & Priest, 2012). Previous studies have also demonstrated that

exercising with music results in increased vigor (Biagini et al., 2012; Hayakawa, Miki, Takada, & Tanaka, 2000) and lower levels of tiredness/fatigue following exercise (Hayakawa et al., 2000). However, other research has not supported the advantageous effect of exercising with music on tiredness/fatigue compared to a control condition (Plante et al., 2011). Moreover, previous research has often suggested increased overall mood increase from exercising with music, but an effect for mood pleasantness has not been directly indicated (Hayakawa et al., 2000). The present study investigated the effects of music and exercise on overall mood in the areas of pleasantness, arousal, and tiredness in order to support current literature and extend findings to the lower intensity exercise modality of walking. It is also possible that music may increase exercise enjoyment.

Exercise, Music, and Enjoyment

Exercise enjoyment, or how much one enjoys an exercise routine, has also been identified as a predictor in maintaining the behavioral change necessary to adhere to an exercise routine (Papandonatos et al., 2007). One study has indicated that participants of high intensity exercise with music rate exercising to be more enjoyable than those who exercise without music (Miller, Swank, Manire, Robertson, & Wheeler, 2010). However, another study found no significant differences in enjoyment between exercising with music and a control condition (Plante et al., 2011). Because exercise enjoyment may impact adherence to an exercise routine, this variable was measured in the present study to address discrepancies in the literature while also investigating whether the effect extends to lighter intensity exercise. If music is found to influence exercise enjoyment, it may be due to lower perceived exertion among music listeners.

Exercise, Music, and Exertion

Studies indicate that listening to music may lower perceived exertion during physical activity, perhaps because music provides a distraction (Kareoghis & Priest, 2012). If one perceives themselves to be working less, he or she may work more or for a longer duration of time. Therefore, if music lowers perceived exertion, listening to music may improve exercise performance and productivity. A meta-analysis indicates that who listen to music rated their perceived exertion at approximately 10% less than those who exercised without music following low to moderate intensity exercise (Kareoghis & Priest, 2012). However, this effect size is small to medium (r=.31) following high intensity exercise (Biagini et al., 2012). In much of this research, however, participants have been provided with pre-selected music from the researchers themselves (Kareoghis & Priest, 2012). It is possible that using music that is preferred and self-selected by the individual may allow for higher levels of distraction, resulting in significantly lower ratings of perceived exertion than the no music exercise conditions (Biagini et al., 2012) The present research therefore sought to determine whether the influence of music on perceived exercise exertion extends to conditions where participants listen to self-selected music.

The Current Study

The purpose of the present research was to replicate and extend research on the various psychological effects of exercising with music. All participants completed 20 minutes of low to moderate intensity exercise. Participants were randomly assigned to exercise with or without self-selected music and completed self-report scales that measured various dimensions of mood, perceived exercise exertion, and exercise enjoyment. Mood was measured both before and after exercise while exertion and enjoyment data were collected only after exercise. On the basis of previous research, the following hypotheses were proposed:

- Hypothesis 1: Exercise will have a significant on mood. Mood will be more pleasant, less tired, and more aroused after exercise than before exercise.
- Hypothesis 2: There will be a significant interaction between exercise and music. Exercise will more strongly affect mood among those who listen to music. Specifically, participants who exercise with music will have more pleasant, less tired, and more aroused moods following exercise than those who exercise without music.
- Hypothesis 3: Those who exercise with music will have lower ratings of perceived exertion than those who exercise without music.
- Hypothesis 4: Those who exercise with music will have higher ratings of exercise enjoyment than those who exercise without music.

Method

Participants

Data was collected from 148 undergraduate students at Columbus State University during both spring and summer sessions. The sample consisted of 107 females and 41 males. Participant age ranged from 18 to 52, (M=22.25, SD=5.125) with 43.9% white and 43.2% black or African American participants. Seventy-three participants were randomly assigned to exercise with music, and 75 were assigned to exercise without music. Because any type of physical activity can pose risks, potential participants were screened using the Physical Activity Readiness Questionnaire (PAR-Q) to potentially exclude those with health conditions that may have affected their ability to exercise (Thomas, Reading, & Shephard, 1992). However, no participants were excluded based on their responses. Participants were at the Columbus State University Recreation Center from various Physical Education classes including general physical

education, weightlifting, kickboxing, yoga, and fitness instructor training. With the cooperation of the course instructor, the study was conducted during class time; however, there was no requirement for participation, aside from good health. Random assignment was used to assign participants to each group: exercise with music and exercise without music. Participants enrolled in Psychology classes may have received credit for participation depending upon the discretion of their particular course instructor. Otherwise, the majority of participants did not receive compensation for their participation.

Materials

Participants were instructed before the study to bring their iPods or mp3 players so that if assigned to the exercise with music condition, each participant will be listening to his or her own, self-selected music. All participants were instructed to exercise, which consisted of walking for 20 minutes at a moderate pace on the indoor track at the Recreation Center. Mood responses were measured and scored both before and after exercise for Pleasant-Unpleasant (Cronbach's alpha of .854 and .859), Arousal-Calm (Cronbach's alpha of .514 and .55), and Positive-Tired mood (Cronbach's alpha of .828 and .797) using the Brief Mood Introspective Scale (BMIS), validated for measuring transient mood states (Mayer & Gaschke, 1988). In this measure, participants reported their mood on a four-item scale ranging from "definitely do not feel" to "definitely feel" in respect to 16 adjectives including "lively," "tired," "content," and "fed up". After exercise, exercise enjoyment was measured on the short form of the Physical Activity Enjoyment Scale (PACES-8), validated for measuring physical activity enjoyment (Raedeke, 2007). This 8-item scale is a shortened version of the original 18-item PACES scale with an internal reliability in this sample of Cronbach's alpha of .882. The PACES-8 required participants to rate how they felt about the previous physical activity on a 7-point Likert scale

ranging from "definitely do not feel" to "definitely feel" on items such as "I find it pleasurable" and "It's no fun at all". Finally, participants were asked to rate their perceived exertion during the completed exercise from 6 (no exertion) to 20 (maximal exertion) on Borg's Rating of Perceived Exertion Scale (RPE), widely used in fitness settings and validated to measure exercise exertion (Borg, 1982). Demographics were also collected for reporting information, and gender was considered when analyzing data.

Procedure

Students attending a physical fitness course were recruited during class time at the campus recreation center, where the study took place. Students were verbally informed about the study and asked to participate. Potential participants were screened for physical activity readiness, and given an informed consent form to consider. After consenting to participate, individuals were given the first mood survey (BMIS) to complete along with instructions assigning them to one of two conditions: exercising with music or exercising without music. If a participant had forgotten their iPod, he or she was automatically assigned to exercise without music. The exercise consisted of walking at a brisk pace for 20 minutes on an indoor track at the Recreation Center. Participants were instructed to exert a moderate effort: enough physical effort to breathe harder than normal, but at a level at which he or she would still able to carry on a normal conversation (CDC, 2011). After completing their assigned exercise, participants completed the final survey packet (RPE, PACES-8, BMIS). Upon submission of surveys, participants were thanked and given a paper debriefing form with more details about the study.

Results

A repeated measures design was used to measure the effects of exercise on the dependent variable of mood. Mood changes after exercise were compared between the music and no music groups to determine if exercising with music had a more positive psychological effect than exercising without music. Therefore, mixed factorial ANOVAs were used to analyze mood data. Because there were two distinct data collecting periods (spring semester and summer session), all data was compared between these times using independent samples t-tests, yielding no significant differences. Data collection time was also included as a between-subjects variable in ANOVA analyses, but no significant effects were revealed. Data collection period was therefore dropped in further analyses. Other dependent variables of perceived exertion and exercise enjoyment was measured between groups and thus tested using independent samples t-tests. Assumptions for these tests were checked before analyses using Levene's test for homogeneity of variance and the Kolmogorov-Smirnov test for normality. All measures met the assumption of homogeneity of variance using Levene's test, but some groups did not meet the normality assumption assessed by the Kolmogorov-Smirnov test. Several transformations including log, natural log, and square root were applied to these groups but did not normalize distributions. In the case of non-normality, nonparametric tests were run instead of the planned t-tests or to support ANOVA results.

Using three mixed-model factorial ANOVAs, the mood dimensions of Pleasantness-Unpleasantness, Arousal-Calm, and Positive-Tired were investigated for the effects of exercise and music predicted in Hypotheses 1 and 2 (see Table 1). In Hypothesis 1, it predicted that exercise would significantly affect mood. According to Hypothesis 2, it was suggested that music and exercise would significantly interact to magnify positive mood effects.

In the Pleasant-Unpleasant mood dimension, data did not meet normality assumptions on the Kolmogorov-Smirnov test in the post-exercise music distribution (p=.039). In an ANOVA analysis, exercise had a significant effect on pleasant mood ratings, $F(1, 134)=27.773$, $p<.001$, which was supported using the Wilcoxon Signed Ranks test (Z=-5.228, $p<.001$). Mood was significantly more pleasant after exercise (M=52.949) than before exercise (M=50.395), supporting Hypothesis 1 for mood pleasantness. Music had a significant main effect on mood pleasantness, $F(1, 134)=4.448$, p=.037, which was confirmed using the Mann Whitney U test, U=1804.0, p=.027 Those assigned to the music condition reported feeling more pleasant (M=52.78) than those assigned to the no music condition (M=50.564). Although music and exercise did not significantly interact in the main ANOVA analysis, $F(1, 134)=2.899$, p=.091, because an interaction was predicted, simple effects were probed for significant differences. To address and minimalize concerns regarding type I errors, a Bonferroni correction was applied for these comparisons, resulting in a new alpha level of .025. While no differences were detected between groups before exercise, $t(137)=1.272$, p=.206, those who listened to music during exercise reported feeling significantly more pleasant after exercise (M=54.47) than those who did not listen to music (M=51.43), U=1908.0, p=.009. These results lend partial support to Hypothesis 2 (see Figure 1).

Exercise also had a significant effect on tiredness, as measured by positive-tired mood $F(1, 134)=32.08$, $p < .001$. Assumptions of normality may have been violated for these groups, so the main effect of exercise was supported using the Wilcoxon Signed Ranks test (Z=-5.57, $p<.001$). Participants were less tired after exercise (M=21.155) than before (M=19.287), supporting Hypothesis 1 for the Positive-Tired dimension. There was also a significant main effect for the music group, $F(1, 134)=3.972$, p=.048. Those assigned to the music condition reported being less

tired (M=20.86) than those assigned to the no music condition (M=19.59). Although music and exercise did not significantly interact in the main ANOVA analysis, $F(1,134)=.639$, $p=.426$, because an interaction was predicted, simple effects were probed for significant differences. As before, a Bonferroni correction was applied to reduce the risk of type I errors, resulting in a new alpha level of .025. No significant differences were detected between groups before (U=2075.0, $p=.152$), or after exercise (U=2003.5, $p=.026$), although the differences between groups after exercise was marginally significant; those who listened to music during exercise reported feeling significantly less tired after exercise (M=21.91) than those who did not listen to music (M=20.4), U=2003.5, $p=.026$.

In the arousal-calm measure of mood, assumptions of normality were not met on the Kolmogorov-Smirnov test in the music group post-exercise ($p=.015$). Analyses indicated that exercise had a significant effect on aroused mood $F(1,134)=12.068$, $p=.001$, and this effect was supported using the Wilcoxon Signed Ranks test (Z=-3.175, $p=.001$). Participants reported more arousal after exercise (M=26.34) than before exercise (M=25.43), supporting Hypothesis 1 for Arousal-Calm mood. The two music conditions did not significantly differ on overall arousal $F(1,134)=1.293$, $p=.257$, which does not support Hypothesis 2 for aroused mood. There was no significant interaction between music and exercise aroused mood $F(1,134)=.004$, $p=.947$. Simple effects were analyzed using a Bonferroni correction to set the new alpha at .025. Analysis revealed no significant differences between music and no music groups before exercise, $t(137)=.834$, $p=.406$, and after exercise, U=2028.0, $p=.219$. Hypothesis 2 was therefore not supported for the arousal-calm measure of mood.

Exercise enjoyment and perceived exertion data was analyzed for group differences. According to Hypothesis 3, we expected that those who exercised with music would rate their

exertion significantly lower than those who exercised without music. Perceived exertion data did not meet normality assumptions on the Kolmogorov-Smirnov test, so the Mann-Whitney Test was used in lieu of the t-test to compare the "music" and "no music" groups. Ratings of perceived exertion were not significantly less for those who exercised with music U=2628.0, p=.777, which does not support Hypothesis 3. In Hypothesis 4, we predicted that those who exercise with music would rate their exercise enjoyment higher than those who exercised without music. Supporting Hypothesis 4, exercise enjoyment was significantly higher among those who exercised with music (M=40.58) than those who exercised without music (M=37.47), $t(145)$=1.986, p=.049.

Discussion

This study investigated various psychological effects of music. Although some hypotheses were not fully supported, this study confirms the effects of music and exercise on mood. Exercise had a significant effect on all mood dimensions, lowering tiredness and boosting aroused and pleasant mood even at the low to moderate level walking enacted in this study. These results align with widespread findings in current research attesting to the mood benefits of exercise (Hansen, Stevens, & Coast, 2001).

Partial support of an interaction in the pleasant-unpleasant mood dimension (see Figure 1) extends previous findings. Although no significant interactions for music and mood were detected through ANOVA analysis, simple effects indicated that pleasant and unpleasant mood differed significantly between music and no music groups after exercise, while no differences were detected between groups before exercise. Previous research has suggested overall mood benefit of exercise with music, although pleasant mood has not been directly measured (Hayakawa et al., 2000; Biagini et al., 2012). Previous findings, with the support of our results,

suggest that music and exercise may combine to increase positive mood to a significantly higher level than exercise alone.

Additional psychological effects of music and exercise supported and extended the findings of previous research. Participants who listened to music during exercise rated their exercise as more enjoyable and their mood as more pleasant than those who exercised without music. The positive effect of music on enjoyment has been indicated in previous research using high intensity exercise (Miller et al., 2010). However, this effect has not been previously supported at low to moderate intensity exercise (Plante et al., 2011). Increased exercise enjoyment and mood pleasantness while listening to music may also support the unique effect of music and exercise on mood. The exercise enjoyment scale included items such as exercise "is gratifying" and "pleasurable," so not only do exercise enjoyment findings support increased mood pleasantness, but they also indicate that those who exercise with music value exercise and respond more favorably to exercise.

Unexpectedly, in the area of perceived exertion, no effect was indicated. The findings of higher post-exercise energy, or lower tiredness, in those who exercise with music suggest the presence of this ergogenic effect. However, data was significantly non-normal and substantially leptokurtic, suggesting a walking intensity may have been fairly consistent. Another possible explanation for the null results is that in order to control exercise intensity, participants were instructed to walk at a moderate pace, which may have coincided to wording on the scale. Lastly, many participants in tested classes may be familiar with the RPE scale, as it is part of the physical education curriculum. Therefore, when instructed to exercise at a moderate intensity, participants may have responded to demand characteristics.

Null results were also obtained for two of the three mood dimensions examined. No

evidence of an interaction was replicated in the arousal-calm dimension of mood. While is it possible that listening music while exercising does not boost mood along this dimension, it should be noted that the Arousal-Calm scale demonstrated low internal reliability (Cronbach's alpha of .550 and .514), which may have inflated error variability and hindered the ability to detect an effect. In the area of Positive-Tired mood, marginally significant findings partially supported previous findings of an interaction between music and exercise to lower tiredness. A Bonferroni correction procedure was applied in examining simple effects to control for type I errors, but this correction is well understood to be one of the most conservative corrections available. Using this correction therefore significantly lowered the statistical power of analyses, rendering the after-exercise group difference marginally significant. One possibility is that listening with music does not boost mood effects along this dimension, but the alternative is that the application of such a conservative correction resulted in a type II error. Perhaps a future replication with a larger sample will help identify the more likely explanation.

As a society, we consistently hear about the benefits of exercise, whether we are at the doctor or watching the news. We know that we *should* exercise, but according to CDC reports, most Americans are not regularly exercising and therefore not receiving the needed health benefits (2011). Although knowing we should exercise may provide some motivation to begin an exercise routine, we lack means to sustain a long-term program. However, music may pose a solution as suggested by this study in combination with current research. Exercise enjoyment and positive mood changes following exercise were demonstrated to predict exercise adherence (Papandonatos et al., 2007), and these post-exercise mood and enjoyment effects were enhanced by use of music in the current study. Because those beginning an exercise regimen are recommended to start at a low intensity exercises such as walking (CDC, 2011), this study is

especially applicable to those wishing to begin and subsequently maintain an exercise program. Also, instructing participants to listen to music on their own personal music players in the music condition demonstrated that the mood benefits of music are easily accessible. Therefore, this study provides evidence that music may be a viable tool to help those who want or need to sustain a lifestyle change.

One of the most prominent and widely used theories regarding behavior is the theory of planned behavior (TPB; Ajzen, 1991). According to this theory, behavior can be predicted from intentions to engage in this behavior while intentions are predicted by three primary factors – attitudes toward the behavior, perceived behavioral control, and subjective norms regarding the behavior. Positive attitudes, higher perceived behavior control, and positive subjective norms are thought to lead to stronger intentions to perform a given behavior (Ajzen, 1991). The TPB has been particularly useful when predicting health-related behaviors, with meta-analyses demonstrating the utility of the TPB in explaining behaviors related to condom use (Albarracín, Johnson, Fishbein, & Muellerleile, 2001), health screenings (Cooke & French, 2008), and exercise behavior (Downs & Hausenblas, 2005; Hausenblas, Carron, & Mack, 1997). In each of these meta-analyses, attitude toward the target behavior was found to be the strongest predictor of behavior intentions, with interesting implications for the present research.[1]

We have argued that listening to music while exercising may increase exercise adherence by boosting the positive impact of exercise on mood and exercise enjoyment. Within the context of the TPB, it is possible that the heightened experience of positive mood and greater exercise enjoyment may have the effect of creating more positive attitudes toward exercise. This increase in positive attitude would, in turn, increase intentions to exercise. An alternative (or perhaps

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[1] The final two paragraphs were written by Dr. Katherine White, Department of Psychology, Columbus State University.

additional) way by which increased mood and enjoyment could increase exercise adherence is through anticipated affect. Anticipated affect refers to whether, after performing or not performing a behavior, one expects to experience positive or negative emotions (Richard, van der Pligt, & de Vries, 1996). When considered as a separate component within the TPB model, a recent meta-analysis demonstrates that anticipated affect significantly predicts behavioral intentions above and beyond the other three components of the model (Rivis, Sheeran, and Armitage, 2009). Positive mood and enjoyment when exercising with music may therefore not only improve attitudes toward exercise behavior, but also increase the positivity of anticipated affect after performing exercise, improving intentions to engage in exercise behaviors. These effects and relationships are speculation at this time, but could be modeled and tested in future research.[1]

[1] The final two paragraphs were written by Dr. Katherine White, Department of Psychology, Columbus State University.

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Appendix

Table 1

Means for each mood dimension for music and control groups before and after exercise.

BMIS Mood Means				
	Pre-Exercise		***Post-Exercise***	
Pleasant-Unpleasant	**M**	**SE**	**M**	**SE**
Music	51.1	0.87	54.5	0.79
Control	49.7	0.84	51.4	0.77
Positive-Tired	**M**	**SE**	**M**	**SE**
Music	19.8	0.52	21.9	0.49
Control	18.8	0.51	20.4	0.47
Arousal-Calm	**M**	**SE**	**M**	**SE**
Music	25.8	0.45	26.7	0.44
Control	25.1	0.45	26	0.43

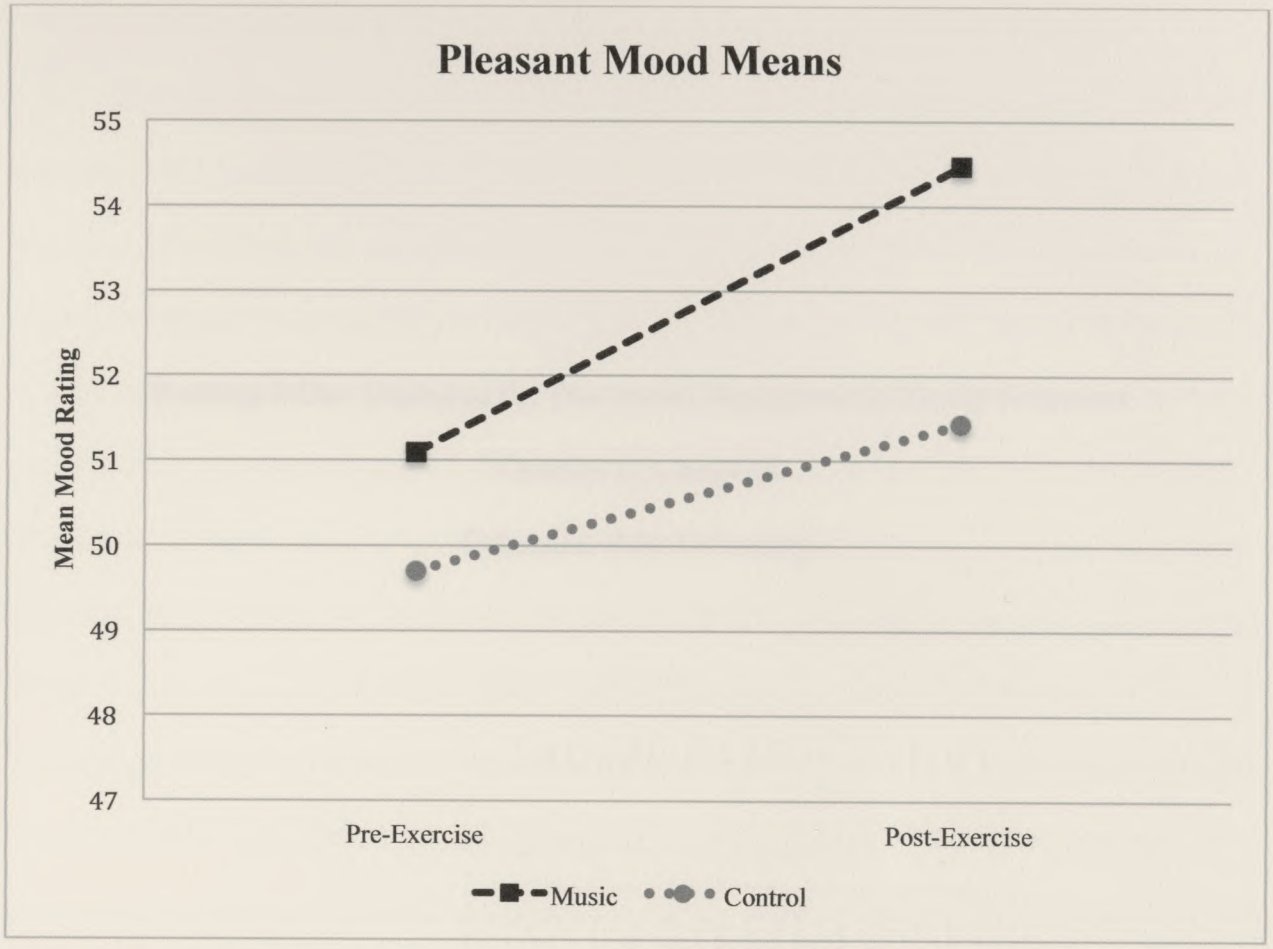

Figure 1. Changes in mean mood ratings within the Pleasant-Unpleasant dimension for music and control groups before and after exercise.

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Working It Out: Exploring the Theoretical Background of Health Behaviors

Part I of this study, "Working It Out: Examining the Psychological Effects of Music and Exercise," was conducted with the purpose of proposing a mechanism to make the physical and mental benefits of exercise more attainable for the 49% of adult Americans who do not achieve minimum exercise recommendations (HHS, CDC, & NCHS, 2011). As mentioned in Part I, this is a startling statistic in lieu of the well-known health benefits of physical activity, but it is not uncommon in the realm of health behaviors. For example, over 40% of physical rehabilitation patients in one study did not engage in their at-home exercises (Pisters et al., 2010). Furthermore, in a study implementing an educational program to inspire college females to seek immunization for HPV, only 6% of participants actually received the vaccine (Gerend & Shepherd, 2012). Medical research may continue to surge forward to cure afflictions that once resulted in countless casualties, but the benefits of the advancement of science are limited by the choices of the individual. So, how do we, as humans decide whether or not to engage in activities we know will prolong our life? This review will consider this broad question with particular focus on the results of Working It Out: Part I.

Part I indicates music as a tool to promote the health behavior of physical activity and suggests it as a mechanism to sustain exercise adherence. In this study, participants who listened to music during exercise reported a significantly more pleasant mood (p=.009) and significantly higher levels of exercise enjoyment (p=.049) post-exercise than those who exercised without music. Those who listened to music also reported lower levels of tiredness (p=.026), which was marginally significant. The implications of these findings in the context of exercise adherence will be critically considered through an exploration of the theories of health behaviors. Therefore, the purposes of this review (Part II) include the following:

- Determine the theoretical significance of the results of Part I in order to further discuss the potential of using music to sustain exercise adherence.
- Explore additional predictors of engaging in health behavior in order to propose optimal conditions for sustaining exercise adherence.

Health Belief Model and Theory of Planned Behavior

The Health Belief Model (HBM) (Figure 1) attempts to explain and predict an individual's likelihood of engaging in behavior to maintain one's health (Rosenstock, Strecher, & Becker, 1988). Several predictors are included in the model, including self-efficacy, perceived benefits and barriers to engaging in the behavior, perceived susceptibility to the health problem treated by the desired behavior, and presence of cues to stimulate action (King, Vidourek, English, & Merianos, 2014). HBM has been used in the context of engaging in physical activity, and an increase in perceived benefits has been associated with higher likelihood to engage in physical activity. Common perceived benefits of exercise listed by participants in one particular study included an increase in energy, enjoyment/fun, and stress relief (King et al., 2014). Results from Part I suggested that adding music to an exercise routine increases feelings of enjoyment and energy (demonstrated by lower scores in "tiredness"), which in turn likely boosts perception of benefits within HBM. Higher levels of perceived benefits were associated with more frequent physical activity (King et al., 2014), so results of Part I suggest that demonstrated mood and enjoyment benefits elicited by listening to music during exercise may increase an individual's likelihood of engaging in exercise.

Predictors such as perceived benefits in HBM overlap significantly with predictors within the Theory of Planned Behavior (TPB) (Figure 2). Current versions of both models include a self-efficacy component, and the subjective norms predictor within TPB closely relates to the cue

to action component within HBM, as norms in engaging in a certain behavior may also motivate action (Gerend & Shepherd, 2012). For example, a physician's recommendation to receive a vaccine is considered a cue to action, but it is also incorporated within TPB as a subjective norm as it contributes to one's perception of society's tendency toward receiving the vaccine. However, the most striking similarity between theories occurs between the TPB construct of attitude and perceived benefits within HBM, illustrated by the fact that one study comparing the two theoretical models utilizes the same survey questions to measure both constructs (Gerend & Shepherd, 2012). Results of Part I demonstrate that the increased enjoyment and mood effects of listening to music during exercise may boost one's perception of benefits within HBM (i.e., improve one's attitude toward engaging in exercise), predicting higher intentions towards exercise within TPB.

Both theories significantly overlap, especially between attitude and perceived benefits, but the Theory of Planned Behavior is particularly different in accounting for intentions and the "gap" between intentions and behavior. TPB traditionally accounts for more variance in actual behavior than HBM (Montanaro & Bryan, 2013), even with the measure of intentions added to the Health Behaviors Model (Gerend & Shepherd, 2012). When both models were included to predict behavior, HBM explains an additional 6% of variance, and although seemingly minute, this significance exemplifies the validity of the Health Behaviors Model (Gerend & Shepherd, 2012). Because the Theory of Planned behavior represents more predicting power and has been demonstrated to predict up to 24% of variance in physical activity (McEachan, Conner, Taylor, & Lawton, 2011), additional predictors are examined primarily in context of this theory.

Affective Response within TPB

Positive affective response to a behavior may strengthen intentions to engage in that activity and therefore may provide additional predicting power within the Theory of Planned Behavior (TPB). Adding the construct of anticipated affect, which, in the context of exercise, refers to the expectation of a positive mood response from the behavior, has been demonstrated to predict additional variance within TPB (Rhodes, Fiala, & Conner, 2009), although the formulator of TPB claims that anticipated mood is accommodated within the attitude component of TPB (Ajzen, 2011). The comparison between TPB and HBM supports Ajzen's assertions, as perceived benefits of health behavior and attitude were measured using an identical construct (Gerend & Shepherd, 2012). Whether anticipated affect is incorporated within TPB, the variable alone has a significant predicting effect on exercise adherence. One study determined that women with a higher level of physical fatigue before an exercise intervention were more likely to continue exercising (Sadja et al., 2012), conceivably because of the magnitude of the post-exercise change in affect. As demonstrated in Part I, exercising with music significantly lowered tiredness and increased mood pleasantness more than exercise alone, potentially leading to a more positive anticipated affect and higher frequency of exercise behavior. Anticipated affect may therefore be indicated for research in its relation to exercising with music and its role in predicting exercise adherence.

Affective judgment, a similar construct to anticipated affect, refers to an individual's judgment of a behavior based on its perceived affective benefits. A meta-analysis of studies relating affective judgment to engagement in physical activity determined that positive affective judgment significantly predicted increased exercise behavior (Rhodes et al., 2009). The particular construct of affective judgment was operationally defined to encompass variables

related to judgments towards exercise, particularly exercise enjoyment as measured by the Physical Activty Enjoyment (PACES) scale (Rhodes et al., 2009). This particular scale was used in Part I to assess exercise enjoyment by determining mood-based opinions towards the completed exercise through assessing agreement to statements such as "It's very invigorating" or "It's very refreshing" (PACES-8). Findings in Part I demonstrate that exercising with music significantly increases exercise enjoyment, or positive affective judgment towards exercise.

Because affective judgment significantly relates to increased exercise behavior throughout current research (Rhodes et al., 2009), the findings of Part I suggest that music may provide a tool for exercise adherence. In fact, it is suggested that interventions using music may boost affective judgment, particularly if participants are able to choose the music and attend to the music during exercise (Rhodes et al., 2009). Results in Part I support this claim, as participants in the music group listened to their own, self-selected music through headphones and demonstrated increased exercise enjoyment. Therefore, because of the effect affective judgment has on exercise behavior, the particular music/exercise condition in Part I may be theoretically indicated for future research in maintaining exercise adherence.

Additional Predictors within TPB

Self-regulatory processes, setting goals, and monitoring goal progress may provide an additional predicting force in inspiring and maintaining health behaviors such as exercise. One particular study provided a weekly exercise goal for participants and then measured self-regulatory processes, such as whether participants were attending to their weekly goal progress and responding to obstacles such as scheduling conflicts (de Bruin et al., 2012). In this study, stronger self-regulatory processes significantly predicted intentions to exercise and accounted for additional variance of exercise adherence behavior within the TPB model. Furthermore, self-

regulatory processes provide additional predicting power to the TPB model in the context of health behavior, including adherence to HIV medication (de Bruin et al., 2012), and may provide an additional mechanism to elicit positive health behaviors. Although not examined in Part I, music may add a motivating factor to physical activity (Chtourou, 2013), and participants in one study indicated that they use a personal music player during exercise in order to exercise more intensely and for a longer duration of time (Barney, Gust, & Ligouri, 2012). Aside from providing a source of motivation, music may also elicit this effect on exercise duration and intensity by providing a distraction to exercise participants, which in turn leads them to perceive lower exertion (Chtourou, 2013; Karageorghis & Priest, 2012). Whether music acts as a motivational aid or source of distraction during exercise, music may be proposed for further investigation as an aid to exercise adherence and physical activity goal progress. Self-regulatory processes in setting and maintaining goals have been indicated to lend more predicting power to the TPB model for various health behaviors and are proposed to mediate the relationship between intentions and behavior (de Bruin et al., 2012).

Behaviors do not always follow intention, and this phenomenon, known as the "intention-behavior" gap, has been characterized with the proverb, "the road to Hell is paved with good intentions." Intentions may predict a portion of how we behave, and our control over the behavior may determine whether intentions adequately predict the behavior (Figure 2) (Ajzen, 2011). Our actual control over the behavior may directly inhibit behavior: one may have strong intentions to exercise, but a physical injury may prevent the behavior. Behavior may also be limited by control beliefs, such as one's perceived ability to fit the behavior into their routine, or scheduling self-efficacy (Murray, Rodgers, & Fraser, 2010; Yoon, Buckworth, Focht, & Ko, 2013). Furthermore, socioeconomic status may influence this relationship, as participants with

lower socioeconomic status reported lower scheduling self-efficacy and subsequently lower exercise participation compared to those with higher socioeconomic status (Murray et al., 2010). Therefore, in determining how to best elicit and sustain exercise behavior, recommendations for physical activity must be accessible to the individual and tailored to his or her schedule and availability, as these aspects may determine the individual's likelihood of actually engaging in exercise.

Discussion

Once an individual engages in exercise, additional exercise may be more likely, as frequency of past behavior predicts behavioral intentions within TPB more so than other predictors within the theory (Ajzen, 2011). However, in order to sustain exercise adherence, initial exercise experiences must reinforce other predictors of intentions in order to increase the likelihood of future exercise behavior. Arguably, exercise may be self-reinforcing, as Part I detected that participants in both music and control groups reported benefits in all measured mood dimensions following twenty minutes of walking. Exercise itself results in an increased affective response, which subsequently may strengthen future intentions to exercise. However, due to the multiple factors influencing of human behavior, the affective benefits of exercise alone do not seem sufficient to guarantee future behavior.

The benefits of exercising with music, as detected in Part I, may lend additional support in strengthening intentions to engage in future physical activity. Because music has been indicated to boost the mood effects of exercise, listening to music during exercise may contribute higher levels of anticipated affect to further strengthen intentions towards exercise behavior. Those who listened to music during exercise also reported significantly higher levels of exercise enjoyment, reflecting their affective judgment of the behavior, thus music may contribute to a

more positive attitude towards exercise, strengthening intentions towards engaging in future exercise behavior within TPB. From the perspective of current research in predicting health behaviors, the findings of Part I strongly suggest music as a tool in sustaining exercise behavior.

However, strong intentions alone may not result in continued exercise behavior. Encouraging individuals intending to exercise to engage in a self-regulatory process may mediate the likelihood of intentions to result in behavior (de Bruin et al., 2012), which reflects that in order to achieve the sense of accomplishment in meeting exercise goals, physical activity may become a higher priority. An individual's control over performing the actual behavior, particularly his or her scheduling self-efficacy, also determines whether intentions translate to behavior (Murray et al., 2010; Yoon et al., 2013). Many individuals are juggling a full schedule with multiple responsibilities, and others may not be able to afford gym membership or exercise equipment. In order to facilitate the conversion of intentions to behavior, exercise must be made accessible to the individual, whether through promoting advice about how to fit activity into a work day or through organizing community programs or parks. Those formulating public health initiatives may further consider how to create an optimal exercise environment by increasing the accessibility of physical activity, therefore empowering individuals with higher levels of control over the behavior.

Exercise has been shown to benefit mental and physical health and reduce the likelihood of developing certain cancers and other diseases (CDC, 2011), and broadcasting this information to the public does provide initial inspiration to act. However, multiple variables, both within and beyond the HBM and TPB theories, influence whether or not we continue to exercise. These theories extend beyond exercise, attempting to explain and predict human behavior and can be applied in terms of health behaviors to answer the question: "Why do we not always act in our

best interest?" Humans are indeed complicated, and sometimes the demands and circumstances of life block us from achieving our intentions. Additionally, the "perceived susceptibility" predictor within the Health Belief Model seems to quantify what often prevents us from engaging in health behavior; we are affected by the optimism bias, that our own risk is less than the general population. However, in seeking health care, we are coaxed to action by health care providers, and through theories of health behavior, medical professionals may help create an environment that favors healthy decisions.

Furthermore, once a behavior is developed in an individual, it seems more likely to continue. An individual may decide to exercise, and especially if he or she chooses to listen to music, the behavior will be reinforced by the resulting mood benefits and enjoyment effects, which ultimately improves his or her attitude towards exercise. This increases the likelihood of future exercise, and as the individual continues to exercise, a habit will form as past behavior further increases the likelihood of future exercise behavior. Moreover, since our behaviors are also predicted by subjective norms (Ajzen, 2011), the people connected to this individual may then develop stronger intentions and therefore become more likely to engage in exercise. Providing a favorable environment to effectively encourage someone to behave in support of his or her health may similarly inspire future positive behaviors in the individual and those around them.

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Appendix

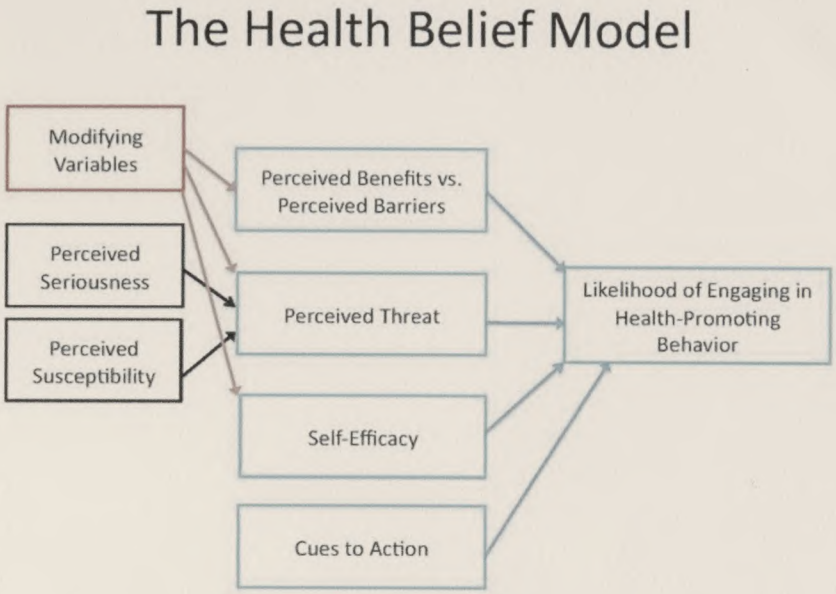

Figure 1. The Health Belief Model (Rosenstock, Strecher, & Becker, 1988). Diagram retrieved from http://en.wikipedia.org/wiki/File:The_Health_Belief_Model.pdf

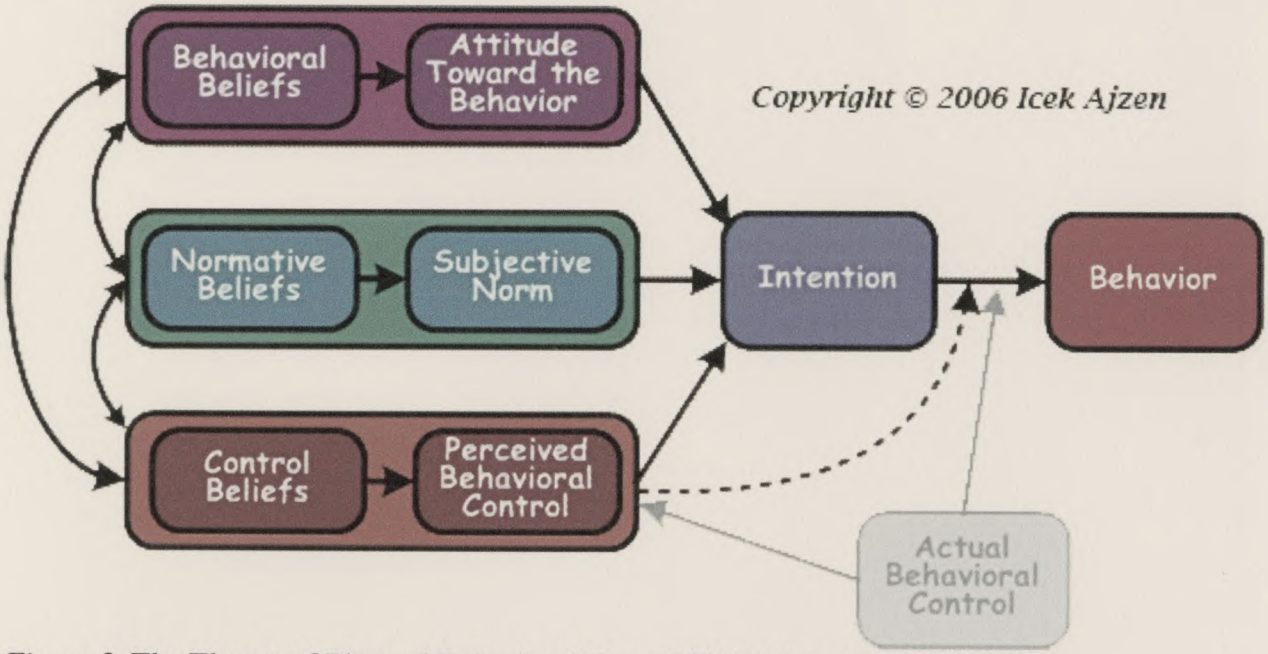

Figure 2. The Theory of Planned Behavior (Ajzen, 2006). Diagram retrieved from http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/SB721-Models/SB721-Models3.html